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UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Research Administration  
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## PROTEIN-SAVING RATIONS FOR BEEF AND DUAL-PURPOSE CATTLE

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### BEEF-CATTLE RATIONS THAT CONSERVE PROTEIN

In order to meet the 1943 beef cattle and beef production goals it will be necessary to make the most efficient use of all feeds with particular reference to those which supply protein.

The beef producer can dispense entirely with protein feed of animal and marine origin and use only those of vegetable origin. For many years cottonseed and linseed meals were practically the only protein concentrates used in beef-cattle rations, but more recently soybean and peanut meals, particularly the former, have contributed materially to the protein supplied.

The 1943 goal of approximately 10,910,000,000 pounds of beef will require the fattening and slaughter of approximately 20,000,000 cattle, exclusive of calves. It is estimated that 40 percent or 8,000,000 head will be fed some protein concentrate. If these 8,000,000 head are fed about 1.5 pounds of highly concentrated protein ingredients per head per day for 180 days, 1,080,000 tons of such feed will be required.

The bulk of this feeding will be done in the Corn Belt and cottonseed, soybean and linseed meals will be the sources of protein concentrates in greatest demand. One and one-half pounds of these concentrates will be quite satisfactory in most cattle-fattening rations. Lesser amounts will suffice in feeding cattle of the older ages, particularly if legume hays can be provided. There is little justification, particularly in these times, for feeding any protein concentrate to fattening steers 2 years old or older if a reasonable quantity of legume hay is fed in conjunction with a good grain ration.

### Choice Between Protein Concentrates and Legume Hay

The beef-cattle man, however, does not have many alternatives in supplying protein. It is essentially between the choosing of one of the protein meals or a legume hay, and many do not produce this kind of hay. As a rule the cattle feeder prefers to purchase a protein concentrate rather than a legume hay, for

the concentrates usually supply protein more economically, and much less labor and transportation are required in handling and feeding.

Where climatic and soil conditions are favorable to the growing and harvesting of legumes for hay, it will be highly desirable to produce just as much legume hay as possible and thus make available more protein feeds for other areas. Attention should be given to harvesting, as the value of the hay depends so much upon its quality, and quality depends largely upon cutting at the proper stage of growth and properly curing and storing it.

The feeding of brewers' and distillers' grains and distillery slops can be a means of relieving the protein shortage in a limited way. While there are many thousand tons of these feeds, the quantity is relatively small compared to the more common feed supplies used for beef production. The feeding of these brewery and distillery by-products will be confined largely to the areas close to the source of supply. Particularly is this true of the slop feed, because of the impracticability of transporting it any great distance.

Feeders using the distillery slops are cautioned concerning the physiological disorders that may result from feeding these products to cattle. Bloating, blindness, and lameness seem to be quite common where cattle are fed almost entirely on slops. These conditions seem to be most serious where the distillery slops contain a high percentage of wheat mash. Much of the trouble aside from bloating appears to be a nutritional deficiency associated with a lack of vitamin A. Bloating is probably due in most instances to a lack of roughage in the ration and in this connection dry roughage such as straw or corn stover should be fed. The feeding of from 3 to 5 pounds of well-cured legume hay (alfalfa, soybean, or clover, etc.) or approximately 35,000 I.U. (International Units) of vitamin A from fish oil, per head daily, should protect cattle against this deficiency.

The fattening of greater numbers of cattle on grass with a grain supplement can alleviate the protein shortage materially. Very satisfactory highly finished beef can be produced from good pasture when supplemented with grain. A protein concentrate is not necessary with the grass-grain combination.

In the range country, it is customary to supplement the winter range with cottonseed or other oil seed cake. The quantities of cake used in this manner are considerable in the aggregate. The reserving of certain ranges or pastures for winter use, and using cake only when necessary will assist materially in the saving of protein feeds. Almost any kind of feed, such as roughage or limited quantities of grain, can be used as supplements to winter range.

The following rations, signifying a daily allowance per animal, are suggested as a means of meeting the requirements of beef cattle under various conditions, and at the same time conserving the protein supply;

I. Fattening cattle in dry lot:

For 1,000-pound steers

<u>Ration 1</u>	<u>Pounds</u>	<u>Ration 2</u>	<u>Pounds</u>
Shelled corn .....	20	Shelled corn.....	17
Legume hay.....	10	Silage.....	20
		Legume hay.....	3
		Straw.....	3

For 800-pound steers

Ration 1

Distillery slop (whole).....	30 gallons	Wheat.....	15 pounds
Corn or barley.....	5 pounds	Silage.....	15 pounds
Straw or stover.....	10 pounds	Straw.....	5 pounds
Vitamin A from fish oil.....	25,000 I.U./		

Ration 2

Wheat.....	15 pounds
Silage.....	15 pounds
Straw.....	5 pounds

For 600-pound steers

Ration 1

Shelled corn.....	10 pounds	Cracked shelled corn.	12 pounds
Distillers' dried grains (wheat or corn).....	2 pounds	Alfalfa, clover or soybean hay.....	7 pounds
Timothy or orchard grass hay/.....	6 pounds		
Ground limestone.....	1 to 2 ounces		

Ration 2

Cracked shelled corn.	12 pounds
Alfalfa, clover or soybean hay.....	7 pounds

1/ If the hay is below average quality, vitamin A should be supplied either as legume hay or fish oil.

For 400-pound steers

Ration 1

Cracked shelled corn.....	5 pounds	Ground barley or grain sorghum.....	10 pounds
Ground wheat.....	5 pounds	Cottonseed meal.....	2 pounds
Cottonseed or linseed meal....	1.5 pounds	Grass hay.....	5 pounds
Legume hay.....	5 pounds	Ground limestone.....	1 ounce

Ration 2

Ground barley or grain sorghum.....	10 pounds
Cottonseed meal.....	2 pounds
Grass hay.....	5 pounds
Ground limestone.....	1 ounce

II. Fattening steers on grass:

For 2-year-old steers

Ration 1

Improved pasture 2-4 acres per head  
for 140 days  
Shelled corn 9 pounds (last half of  
grazing season)

Ration 2

Improved pasture 3-4 acres per  
head for 140 days  
Cracked shelled corn 7 pounds  
throughout the grazing season

For calves with dams on improved pasture,  
fed in creeps

Ration 1

Cracked shelled corn.....	4
Crushed oats.....	2

Pounds

Ration 2

Cracked shelled corn..	2
Crushed oats.....	2
Ground wheat (coarse).	2

Pounds

III. Wintering cows on range

Ration 1

Reserved winter range<sup>1/</sup>/.....  
Cottonseed cake..... 1.5 pounds

Ration 2

Reserved winter range<sup>1/</sup>/.....  
Grain mixture(corn, barley,  
wheat, or grain sorghums  
or  
Mixture composed of equal  
parts of either two or  
more of these grains)..... 3 pounds

<sup>1/</sup> (Reserved range in this instance is pasture or range which has not been grazed during at least the last half of the growing season.)

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## CONSERVING PROTEIN IN DUAL-PURPOSE CATTLE RATIONS

One of the important problems confronting the feeder of lactating dual-purpose cows is to furnish an adequate supply of vegetable protein in the ration, especially when pastures are poor or where the roughage supply is lacking in this substance. There is the danger of underproduction when the ration is too low in protein, but where a good quality of roughage is available a grain mixture lower in protein than would otherwise be advisable may be fed.

### Basis for Formulating Ration

The commonly accepted feeding practice for lactating dual-purpose cows is to feed all the roughage and silage they will consume and then add grain according to the amount of milk produced, approximately 1 pound of grain to 4 pounds of milk, more grain being fed when the hay is of poor quality or late in summer when pastures are short, and a smaller amount of grain when the roughage is of high quality and the pasture supplies an abundance of feed. Another factor to be considered is the economy of production. When milk is high in price, it may be economical to feed more grain to increase production, even to the low producers in the herd. The maximum to be fed in this case would be the amount where the increase of grain fed ceases to be offset by the increase in milk.

There is a possibility of increasing production by giving the cow a longer rest period between lactations and feeding well during the period in order to have the cow in better condition at the time of calving. It may be even more economical to feed the cow on a higher level while producing, rather than to provide only enough nutrients for production and maintenance with the expectation of getting the cow in condition during the rest period. Under normal conditions a dry period of at least six weeks should be allowed. While availability of vegetable proteins may be the limiting factor in the ration, cottonseed meal may be substituted for soybean meal or ground soybeans for linseed meal in the grain mixture. Salt should be available at all times, from 1 to 2 percent mixed with the grain, or fed free choice.

Where cows are allowed all the legume hay they will eat and no silage is available, the following mixtures are suggested:

<u>Mixture 1</u>	<u>Pounds</u>	<u>Mixture 2</u>	<u>Pounds</u>
Corn and cob meal.....	1200	Corn and cob meal.....	1100
Ground oats.....	600	Ground oats.....	700
Linseed meal or ground soybeans.....	200	Linseed meal.....	100
Salt.....	30	Cottonseed meal.....	100
		Salt.....	30
<u>Mixture 3</u>	<u>Pounds</u>	<u>Mixture 4</u>	<u>Pounds</u>
Ground corn.....	900	Ground corn.....	500
Ground barley.....	800	Ground oats.....	500
Ground oats.....	200	Ground barley.....	500
Soybean meal.....	100	Wheat bran.....	500
Salt.....	30	Salt.....	30

Where legume hay and corn silage are fed, one of the following grain mixtures can be used:

<u>Mixture 5</u>	<u>Pounds</u>	<u>Mixture 6</u>	<u>Pounds</u>
Corn and cob meal.....	850	Corn and cob meal.....	1000
Ground oats.....	850	Ground oats.....	700
Soybean meal.....	100	Soybean meal or cottonseed meal	300
Linseed meal.....	100	Salt.....	30
Cottonseed meal.....	100		
Salt.....	30		

<u>Mixture 7</u>	<u>Pounds</u>	<u>Mixture 8</u>	<u>Pounds</u>
Ground corn.....	1000	Ground barley.....	900
Ground oats.....	600	Ground oats.....	500
Linseed meal.....	400	Wheat bran.....	400
Salt.....	30	Linseed meal.....	200
		Salt.....	50

When the roughage available is timothy hay, a poor quality of legume hay, mixed timothy and clover, corn or sorghum fodder, or corn or sorghum silage, one of the following mixtures may be used:

<u>Mixture 9</u>	<u>Pounds</u>	<u>Mixture 10</u>	<u>Pounds</u>
Corn and cob meal.....	800	Ground corn.....	800
Ground oats.....	700	Ground oats.....	600
Linseed meal.....	300	Linseed meal.....	200
Soybean meal.....	200	Soybean meal.....	200
Salt.....	30	Dried brewers' grains.....	200
		Salt.....	30

Cottonseed meal may be substituted for soybean meal, ground soybeans for linseed meal, barley or wheat for corn or oats, and ground shelled corn for corn and cob meal.